

SINOSPHERE

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future for China and the world*

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In This Issue

Spring has hit with a vengeance in much of the world, but the northern United States (where two of us live) retains vestiges of winter. So we are not entirely incorrect in labeling this issue the Winter 2001 version of Sinosphere. Still, we hope that the perspectives contained within this issue are as fresh as the plum blossoms and warm breezes of the first days of April.

We intend, too, that the hopefulness of spring is reflected in some of the news reported here. Jonathan Sinton and David Fridley from Lawrence Berkeley Labs provide evidence from cooperative research that China's carbon dioxide emissions have fallen far below expectations in a period of rapid GNP growth. Lin Gan distills lessons for China's development of clean electricity from experiences elsewhere in the world. Changhua Wu tackles the high-profile Western Development Project, outlining the

massive challenges faced in western China and identifying some practical tools to ensure integration of sustainability with development planning. Thomas Shen similarly aims to provide methodology by which poverty alleviation and pollution prevention can come together to improve quality of life for China's poor.

We hope that this issue can once again provide useful information, new perspectives and reasons for optimism to those of you grappling with environmental degradation in China and elsewhere. We suggest you read this issue outside in the sun.

Field Notes - Abstracts from Recent Research

Growth in China's Carbon Dioxide Emissions is Slower than Expected

Jonathan E. Sinton and David G. Fridley¹

Concern about China's emissions of carbon dioxide runs high because the country is now the second largest contributor to global greenhouse gas emissions, and seems poised to become an ever larger source. China now accounts for about 14% of global emissions of carbon dioxide from fossil fuel use, by far the most important greenhouse gas produced by humans, compared to 23% for the US.

Since 1999, LBNL's Environmental Energy Technologies Division has been assisting a group of national-level Chinese energy researchers to develop and use a computer model to analyze scenarios of China's energy use and carbon dioxide emissions from 1998 to 2020 (China Energy and Carbon Scenarios Project). While development of complete scenarios is still some months away, one conclusion has already become clear: it seems highly unlikely that China will surpass—or even rival—the United States as the world's leading emitter of carbon dioxide by 2020.

In fact, China's emissions of carbon dioxide have shrunk by 17% since the mid-1990s, from just over 800 million metric tons of carbon [MtC] in 1996 to about 670 MtC in 2000, as energy use has fallen. Remarkably, over the same period, GDP grew by 36%. The reduction in emissions is shown in Figure 1, which compares China's actual carbon dioxide emissions with emissions scenarios from a number of widely circulated studies, our provisional revised baseline for China's future emissions, and actual and projected carbon dioxide emissions from the United States. The figure demonstrates the wide range of emissions levels that have been attributed by different studies to China 20 years hence, and the uniform expectation of significant growth (2% to 5% per year between 2000 and 2020). China's carbon dioxide emissions are already 100 to 200 MtC below what was expected in 2000, approximately equivalent to all carbon dioxide emissions from Canada (at the low end of the range) or Germany (at the high end). Accounting for shrinking energy use in recent years also brings down estimates of China's carbon dioxide emissions in 2020

by several hundred MtC, substantially widening the projected gap between emissions from the United States and China.

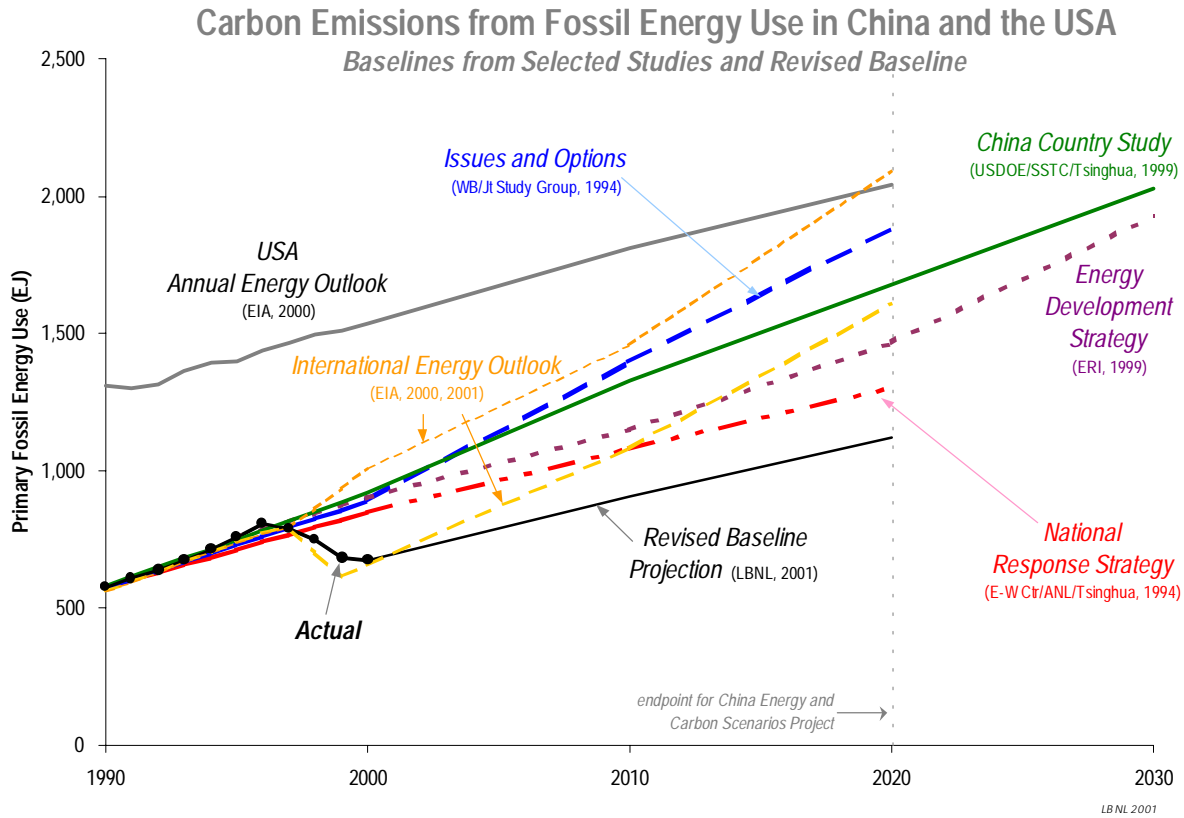
While the decline in carbon dioxide emissions in the late 1990s was not entirely intentional, it demonstrates that China, even without undertaking legally binding commitments under an international agreement to reduce carbon dioxide emissions, has nevertheless contributed substantially to reducing growth in global emissions. The drop in energy use—almost entirely a reduction in coal use—was brought about by a complex combination of forces, including energy-efficiency programs, energy price and market reforms, household fuel switching, and especially economic system reforms that closed inefficient factories and shifted production to more efficient ones.

These forces, as well as increasing availability of natural gas and strengthening environmental-protection efforts, will continue to suppress growth in energy demand in the future, even as the Chinese economy grows over the long-term. Statistics and other information show that China's energy use is already growing again, slowly. If economic growth continues at a very high long-term average rate of 5% to 6% per year (as called for in official long-term plans), we estimate that, by 2020, China's carbon dioxide emissions will be just over 1,100 MtC ("Revised Baseline Projection", Figure 1), about twice its 1990 levels, and still significantly below US emissions in 1990 of 1,300 MtC. Even if China managed to expand its economy at the current rate of 7% to 8% per year for 20 years, natural gains in efficiency, structural change in the economy, and improvements in fuel structure would mean that its carbon dioxide emissions in 2020 would be about 1,600 MtC, or near the level of emissions from the United States in 2000.

Even though growth in carbon emissions is likely to be slower than expected, further reductions may be desirable, and could be achieved with net gains to China's economy. Deliberate policies to affect energy supply and use could range from increasing the availability of natural gas and renewable energy sources, to raising the efficiency of end-use devices like electric motors, vehicles and appliances. Such efforts would not only further drive down growth in China's carbon dioxide emissions over the coming two decades, but, as has been shown for other countries, could also boost productivity and reduce local and regional environmental costs. Such an outcome would benefit not just China, but all nations with an interest in her economic and environmental performance.

¹ The authors, from Lawrence Berkeley National Laboratory, wrote this piece in early April 2001 and can be reached at <jesinton@lbl.gov>.

Figure 1. Actual and Projected Carbon Emissions, USA and China



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